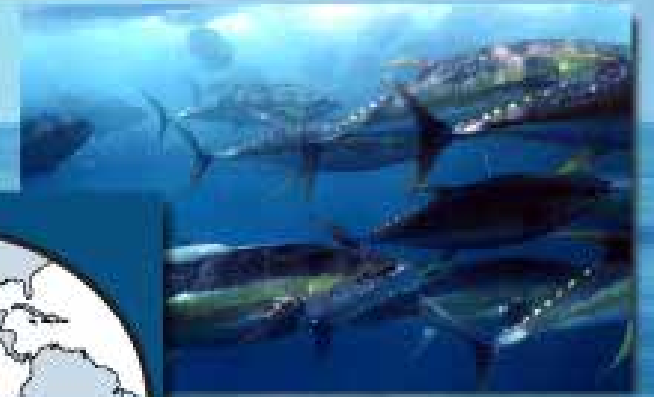


Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Ecosystem considerations (SAC-14-11)

Leanne Fuller, Shane Griffiths and Jon Lopez

14a Reunión del Comité Científico Asesor - 15-19 de mayo de 2023
14th Meeting of the Scientific Advisory Committee, 15-19 May 2023

Outline

- Review IATTC ecosystem mandates and the Ecosystem Approach to Fisheries (EAF)
- Review important components to SAC-14-11
 - § Part 1: Reporting of bycatch by taxonomic group
 - § Continued need for improved data reporting on bycatch
 - § [IATTC Special Report 25](#); [SAC-12-09](#); [SAC-14 INF-J](#); collaborative workshops e.g., [WSDAT-01-RPT](#)
 - § Part 2: Reporting of physical environmental indicators
 - § Part 3: Ecological Risk Assessments (ERA) ([BYC-11-02](#), [SAC-14-12](#))
 - § Part 4: Update of ecosystem model indicators (ETP-21)
- Summary
- Future research



IATTC mandates

- Under the Antigua convention, the IATTC is responsible for ensuring the “*long-term conservation and sustainable use of the stocks of tunas and tuna-like species and other associated species of fish taken by vessels fishing for tunas and tuna-like species in the eastern Pacific Ocean (EPO)*”
- Article IV. “*Where the status of target stocks or non-target or associated or dependent species is of concern, the members of the Commission shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new scientific information available.*”
- Article VII. “*adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened*”

Ecosystem Approach to Fisheries (EAF)

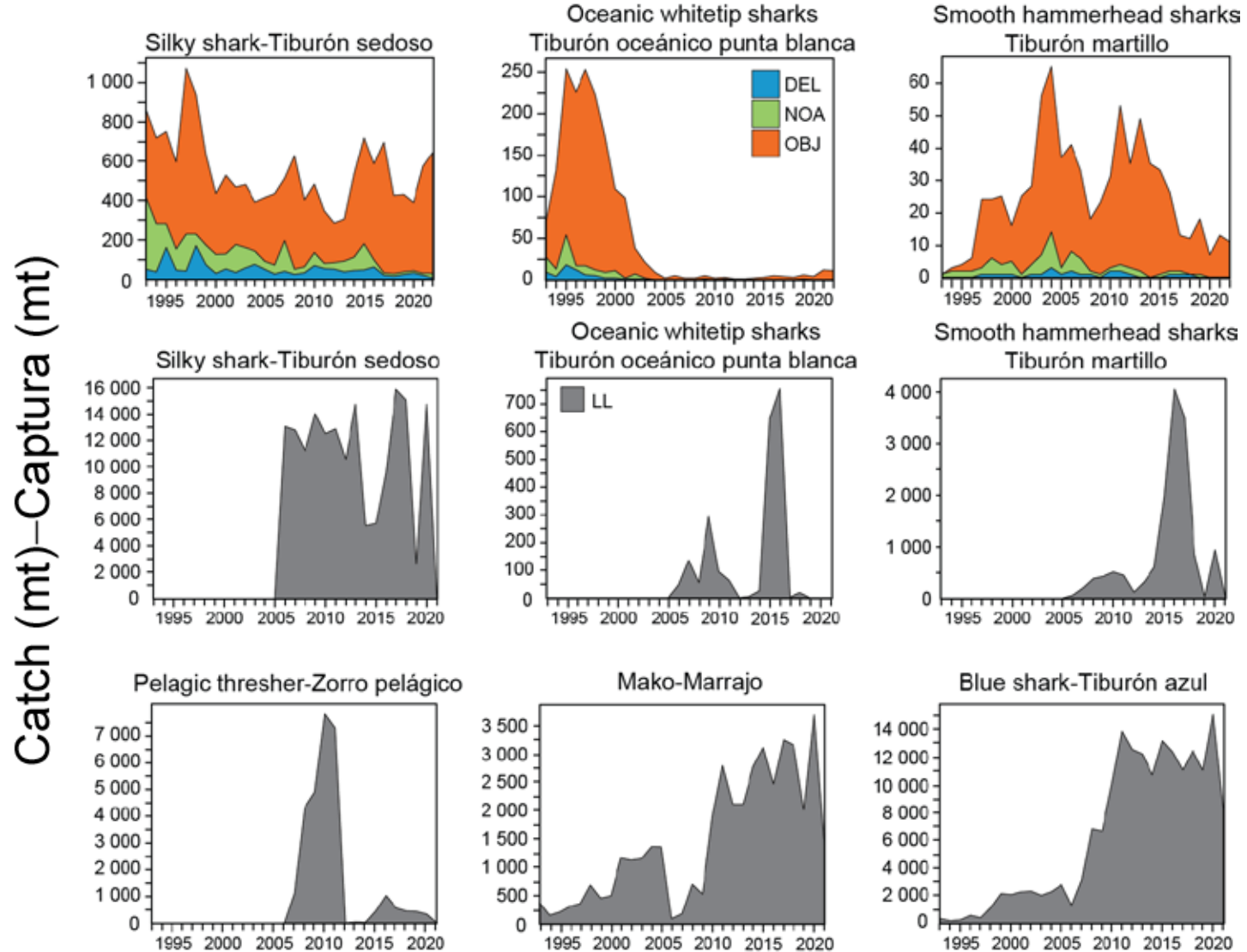
- Recognizes broader impacts of fisheries on the ecosystem
- IATTC proactive in pursuing EAF and ecological sustainability
 - § Dolphin mortality limits (DMLs)
 - § Monitoring catches of incidentally-caught species
 - § Resolutions pertaining to such species (e.g., silky and oceanic whitetip sharks, mobulid rays)
 - § Research on trophic ecology
 - § Development of the ETP ecosystem model ([Olson and Watters, 2003](#)); model updates (e.g., [SAC-12-13](#))
 - § Development and application of ecological risk assessment methods (e.g., EASI-Fish; [BYC-11-02](#); [SAC-13-11](#); [SAC-14-12](#))

Reporting of bycatch species

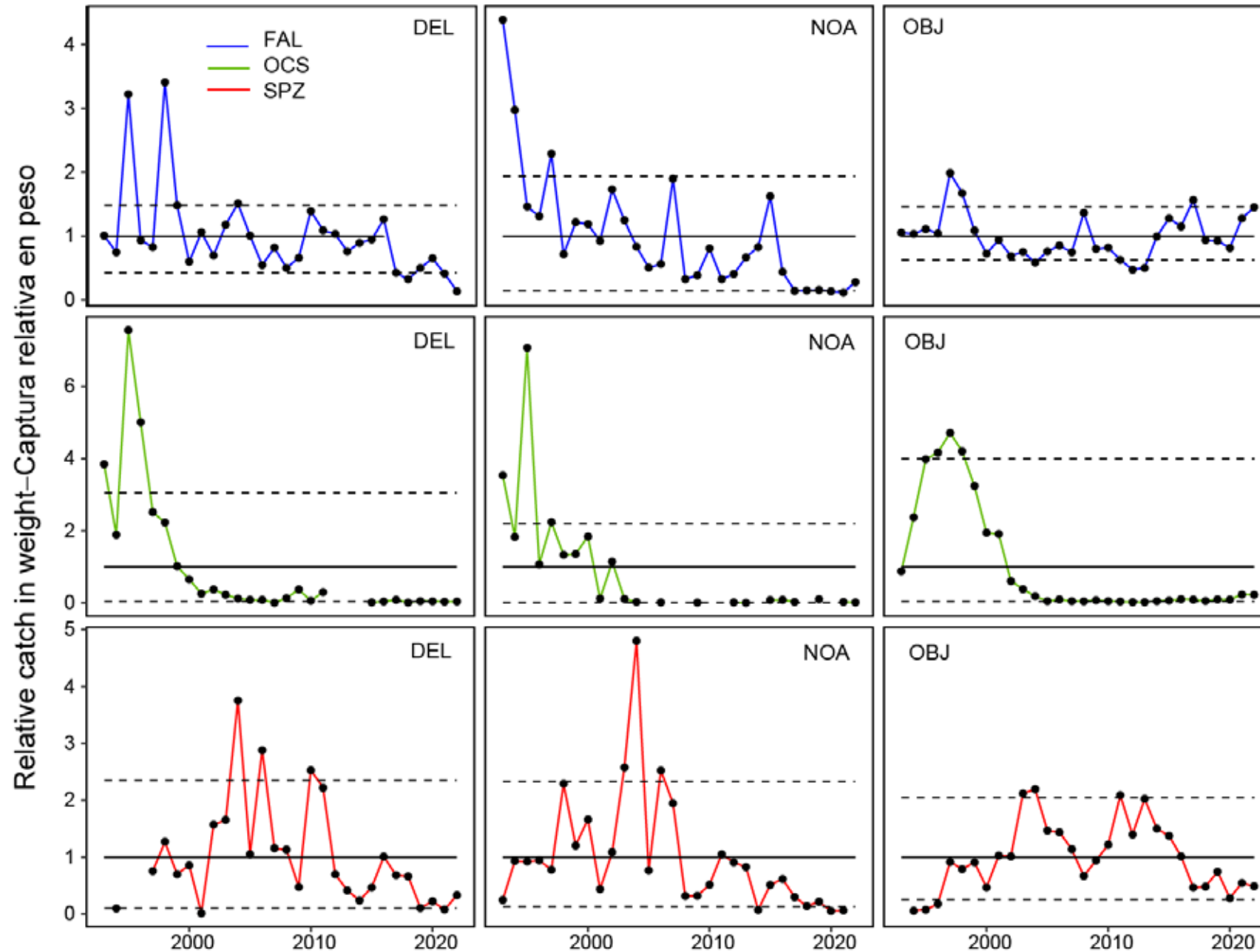
- § Provide transparency and context to the relative magnitude of change of bycatch (PS fishery)
 - § Species-specific catches (1993–2022; PS observer data)
 - § History of bycatch data reporting ([IATTC Special Report 25](#))
- Inclusion of minimum catch estimates by longline vessels
 - § Obtained using “Task I” data of gross annual removals (time series where available)
 - § Incomplete, highly variable data
 - § Iterative process to improve LL data reporting
([SAC-08-07b](#), [SAC-08-07e](#), [SAC-09 INF A](#), [SAC-10 INF-H](#), [SAC-12-04](#), [SAC-13-04](#), [WSDAT-01-RPT](#))
 - § Observer data currently insufficient for reliably estimating annual bycatches ([BYC-10 INF-D](#))
 - § Minimum longline observer-reported interactions and mortalities (2021)
- Inclusion of minimum catch estimates by small purse-seine vessels
 - § Limited observer data (34% of trips carried an observer; 2022), mostly TUNACONS vessels
- To improve catch estimates, bycatch reporting must be improved
 - § see [SAC-12-09](#); [WSDAT-01-01](#); [WSDAT-01-RPT](#); [Project F.3a](#); [SAC-14 INF-J](#)

Reporting of bycatch species: Shark example

- Mortalities (mt) from the purse-seine fishery and minimum estimates by longline
- PS data through 2022; LL data through 2021

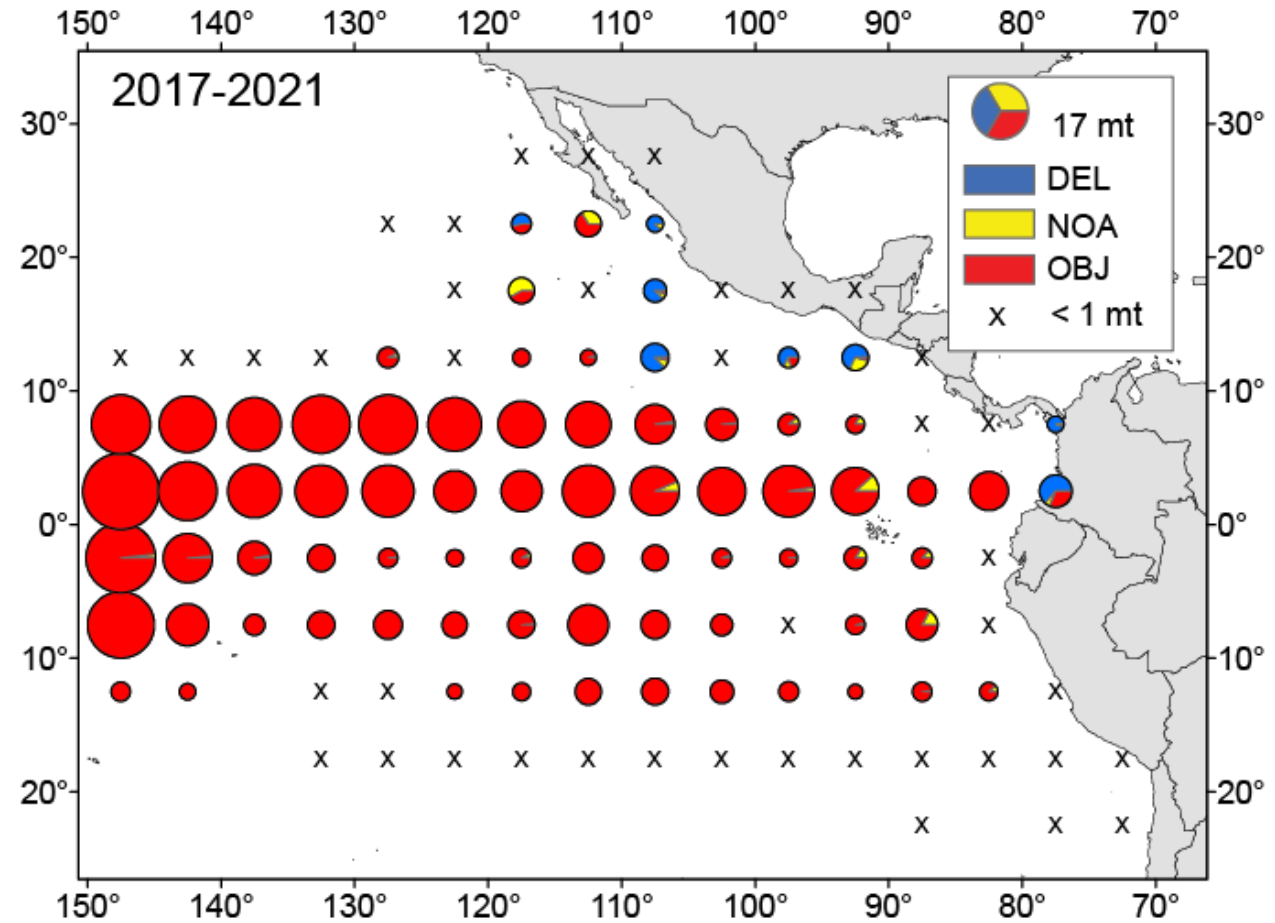
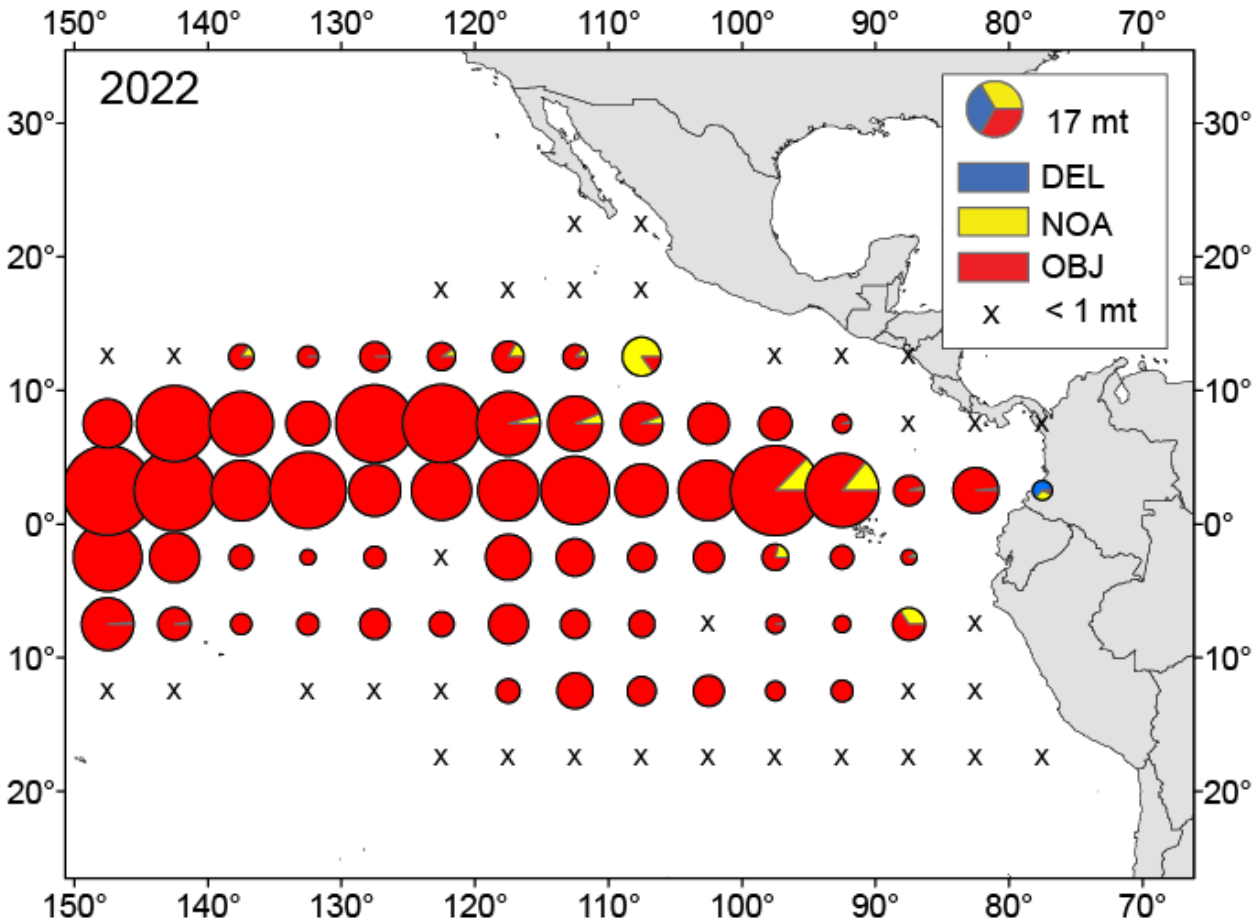


Reporting of bycatch species: Shark example, PS Class-6



Reporting of bycatch species: Shark example, PS Class-6

Silky shark 5x5 spatial distribution of catches for the previous year (2022) and the 5-year average (2017–2021)



Reporting of bycatch species: Small purse-seine fishery (2022)

- Minimum reported mortalities (mt) from limited observer data
- Data reporting for these vessels has been improving
- 34% of trips were observed (27%: voluntary TUNACONS vessels)
- Analyses planned to determine whether data are representative of fleet characteristics to expand to fleet totals

Broad group	Common name	Scientific name	Set type	
			OBJ	NOA
Sharks	Silky shark	<i>Carcharhinus falciformis</i>	29	<1
	Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	<1	-
	Blue shark	<i>Prionace glauca</i>	<1	-
	Other Carcharhinidae spp.	Carcharhinidae spp.	<1	-
	Scalloped hammerhead shark	<i>Sphyrna lewini</i>	4	-
	Smooth hammerhead shark	<i>Sphyrna zygaena</i>	2	-
	Great hammerhead shark	<i>Sphyrna mokarran</i>	<1	-
	Pelagic thresher shark	<i>Alopias pelagicus</i>	<1	-
	Bigeye thresher shark	<i>Alopias superciliosus</i>	<1	-
	Mako shark	<i>Isurus</i> spp.	<1	-
Large fishes	Dorado	<i>Coryphaenidae</i> spp.	289	<1
	Wahoo	<i>Acanthocybium solandri</i>	26	<1
	Rainbow runner	<i>Elagatis bipinnulata</i>	2	
	Amberjack, nei	<i>Seriola</i> spp.	2	
	Jacks, crevalles, nei	<i>Caranx</i> spp.	<1	
	Amberjack, jack, crevalles, nei	<i>Seriola, Caranx</i> spp.	<1	
	Tripletail	<i>Lobotes surinamensis</i>	2	
	Mola, nei	Molidae spp.	<1	
Other large fish		<1		
Small fishes	Bullet and frigate tunas	<i>Auxis</i> spp.	128	-
	Triggerfishes, Filefishes	Balistidae, Monacanthidae spp.	84	<1
	Sea chubs	Kyphosidae spp.	3	
	Small carangid, nei	Carangidae spp.	<1	
	Epipelagic forage fishes		<1	

Reporting of bycatch species: Seabird example, LL observer data (2021)

- Minimum reported interactions & mortalities from limited observer data (5% observer coverage)
- [BYC-10 INF-D](#) shows 5% observer coverage is insufficient for estimating total catch of data-rich YFT and BET, so estimates for bycatch are less reliable due to less data
- Some CPCs suspended observer programs due to COVID-19

Seabird taxa	Interactions	Mortalities
White-chinned petrel, <i>Procellaria aequinoctialis</i>	63	63
Wandering albatross, <i>Diomedea exulans</i>	58	58
Black-browed albatross, <i>Thalassarche melanophrys</i>	53	53
Laysan albatross, <i>Phoebastria immutabilis</i>	45	45
Black-footed albatross, <i>Phoebastria nigripes</i>	44	44
Cape petrel, <i>Daption capense</i>	27	27
Albatross nei, <i>Diomedea</i> spp.	25	25
Boobies and gannets nei, Sulidae	16	16
White-capped albatross, <i>Thalassarche steadi</i>	3	3
Terns nei, <i>Sterna</i> spp.	3	3
Great shearwater, <i>Puffinus gravis</i>	2	2
Petrels or shearwaters nei, Procellariidae	1	1
Total numbers	340	340

Data Improvement Workshops: SAC-12-16 Recommendation

- Staff collaborated on [SAC-12-09](#) on improving species and catch data reporting
- Staff reviewed Data Provision Resolution ([C-03-05](#))
 - § Mandates submission of majority of fisheries data
- Staff concluded [C-03-05](#) needs updating to align with mandates of:
 - § Antigua Convention, IATTC's SSP, the FAO, and other t-RFMOs

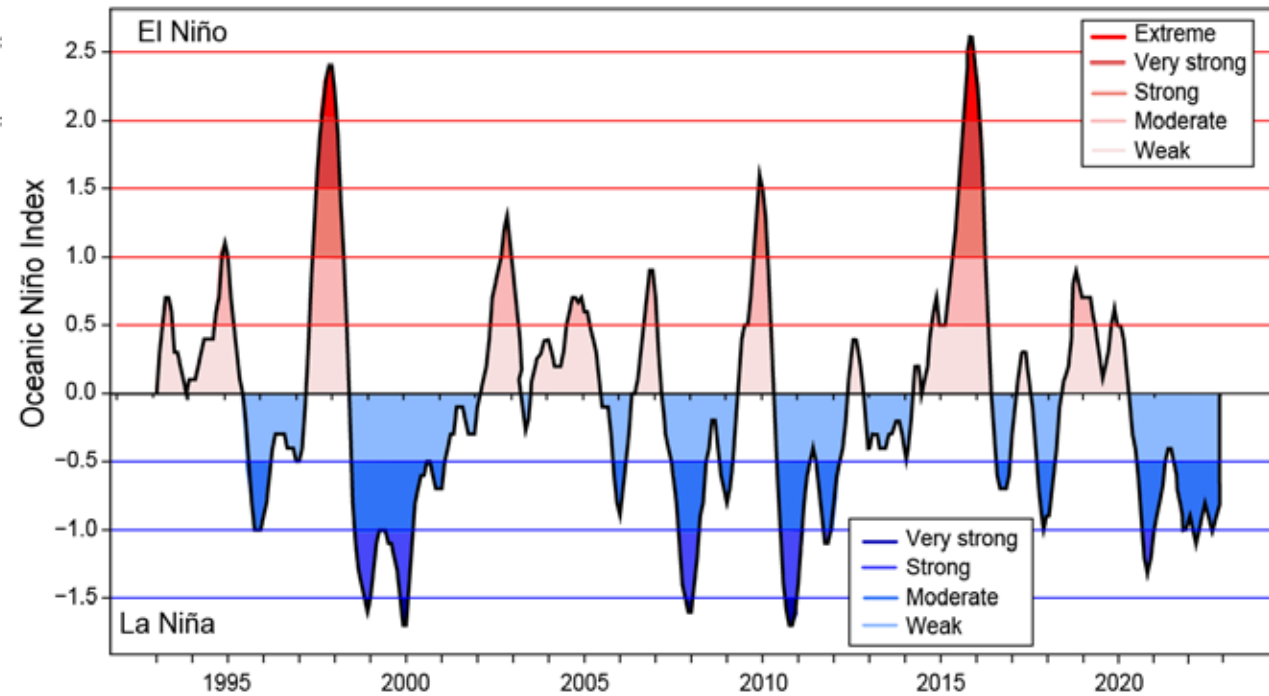
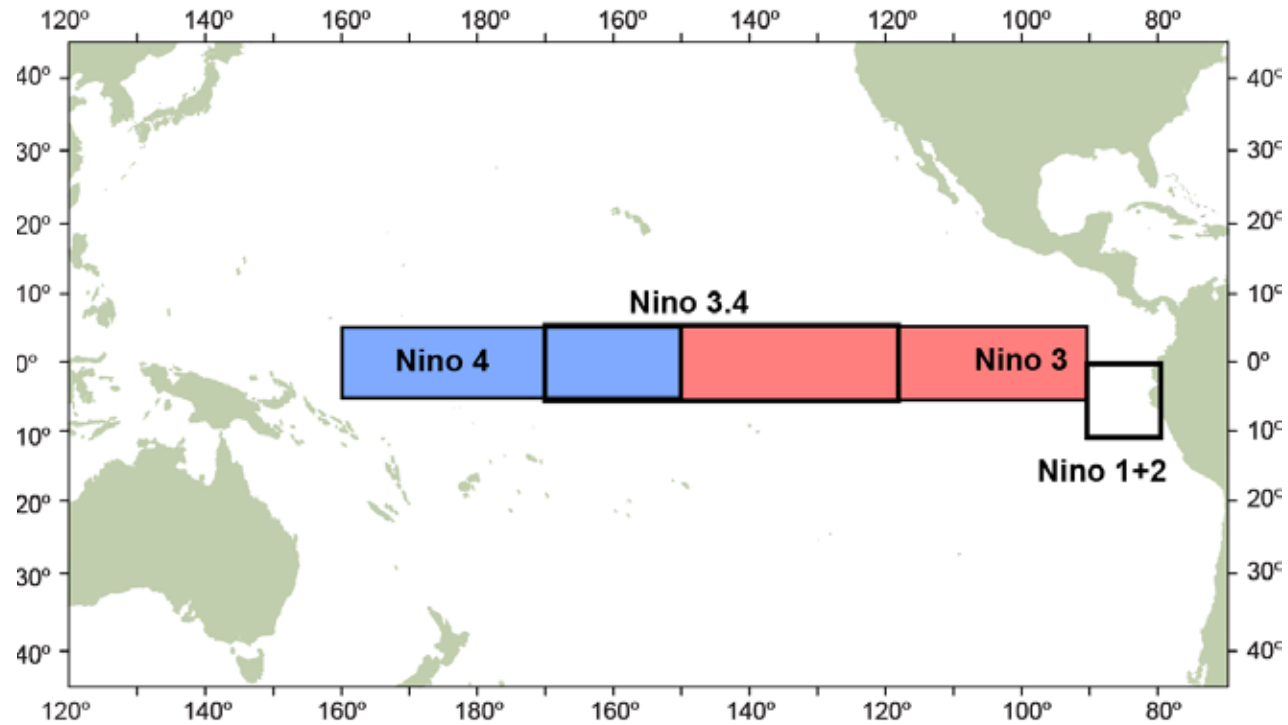
RECOMMENDATION: Through a series of workshops planned and facilitated by the staff, revise resolution C-03-05 in consultation with CPCs, taking into consideration the elements presented in SAC-12-09. These workshops will be organized by main fishery with the purpose of discussing improvements in data collection, any required additional resources and capacity building activities.

- 1st Workshop on Data Improvement: Industrial LL fishery ([WSDAT-01-01](#); [WSDAT-01-RPT](#))
 - § Discussions focused on feasibility of collecting desirable data types, including interactions with bycatch
 - § Recommendations from this workshop provided in [SAC-14 INF-Q](#)
 - § Staff continue to recommend increased observer coverage to improve bycatch data reporting

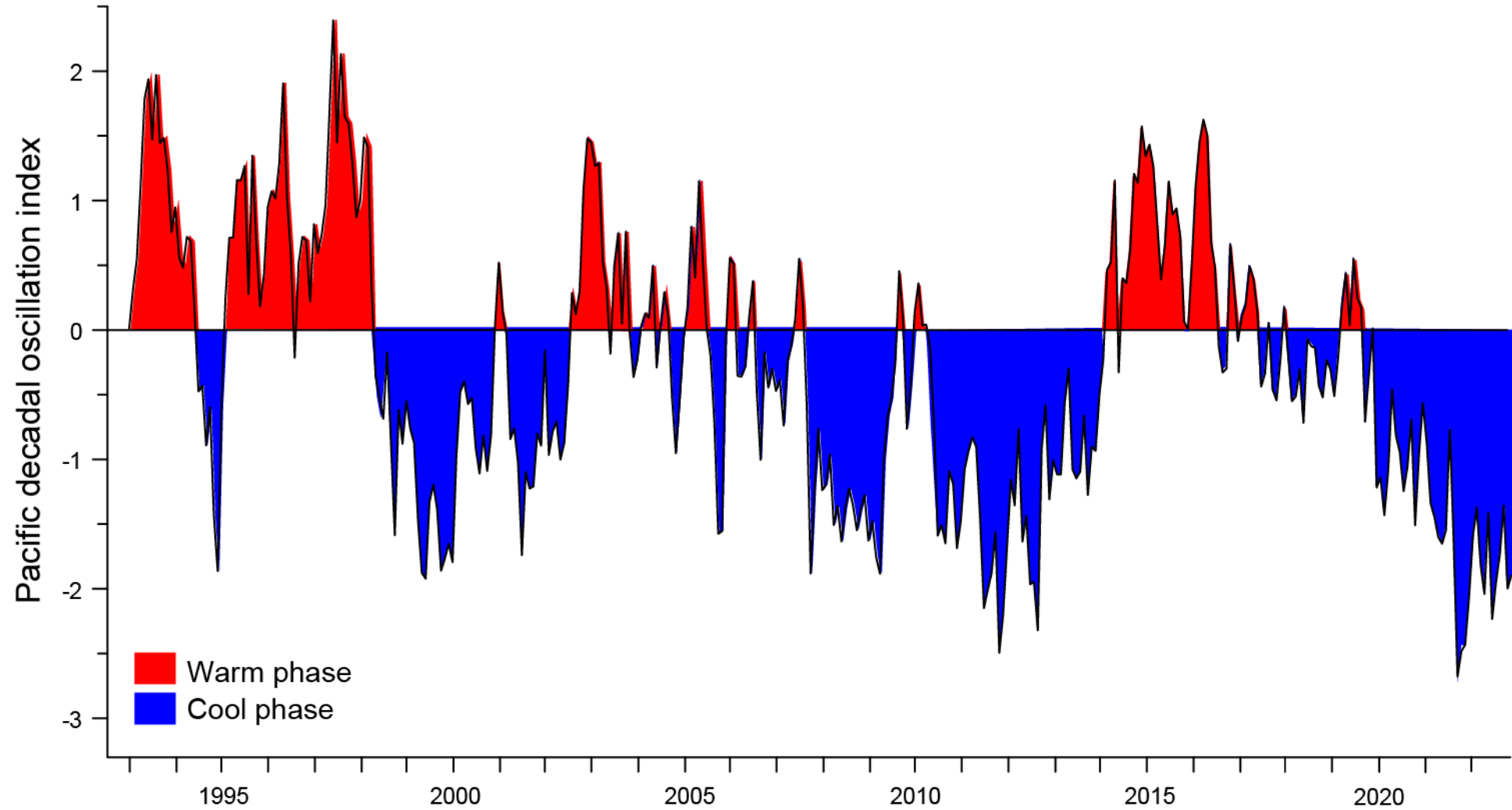
Physical Environment

- Oceanographic indices to describe SST anomalies
 - § Shorter-term, interannual events (e.g., climatology, ENSO events)
 - § Longer-term, interdecadal events (e.g., Pacific Decadal Oscillation (PDO))
- Primary indicator of warm El Niño and cool La Niña conditions
 - § Oceanic Niño Index (ONI), Niño 3.4 region
- PDO tracks large-scale interdecadal patterns of environmental changes
 - § Primarily in NPO, secondary signatures in tropical Pacific

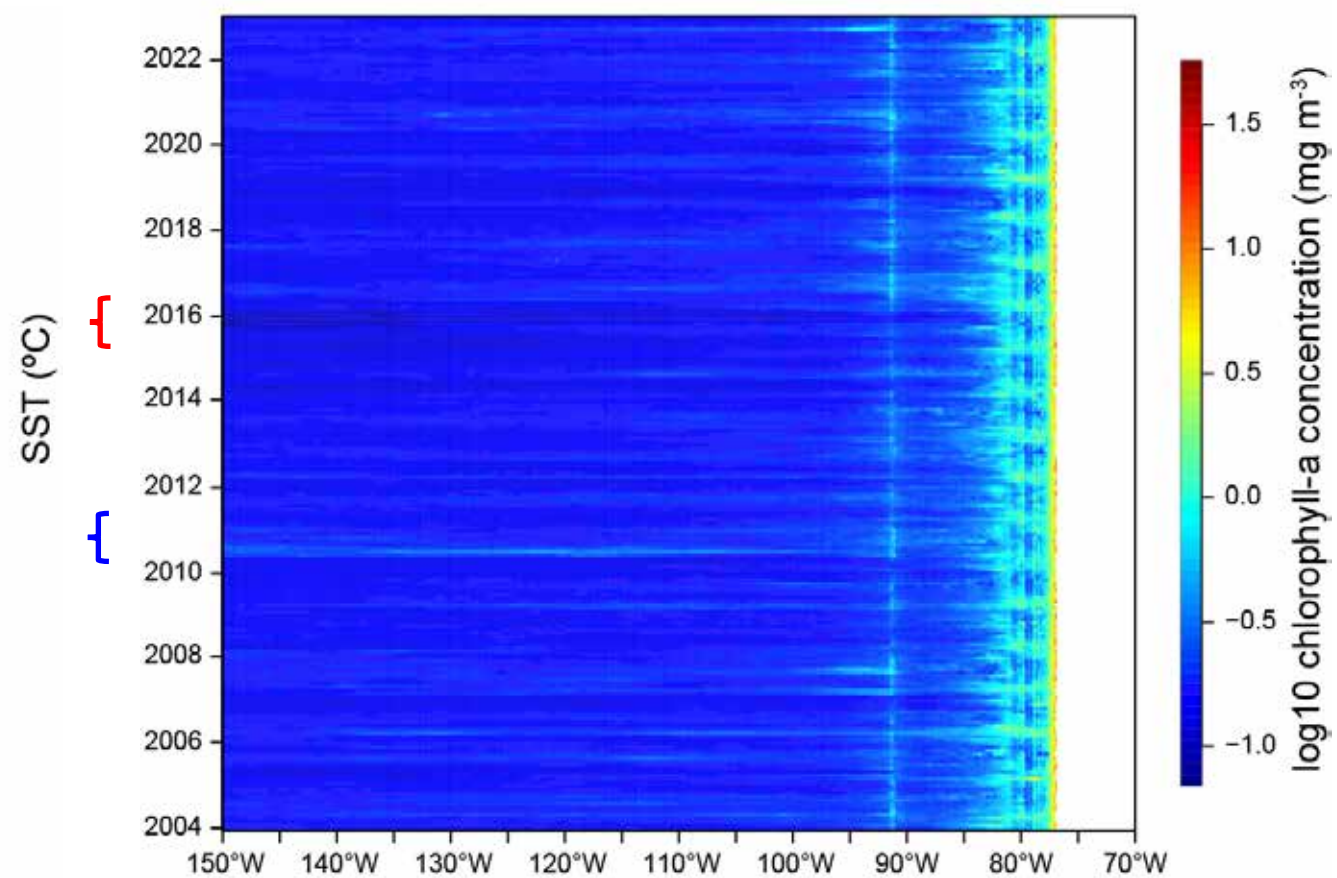
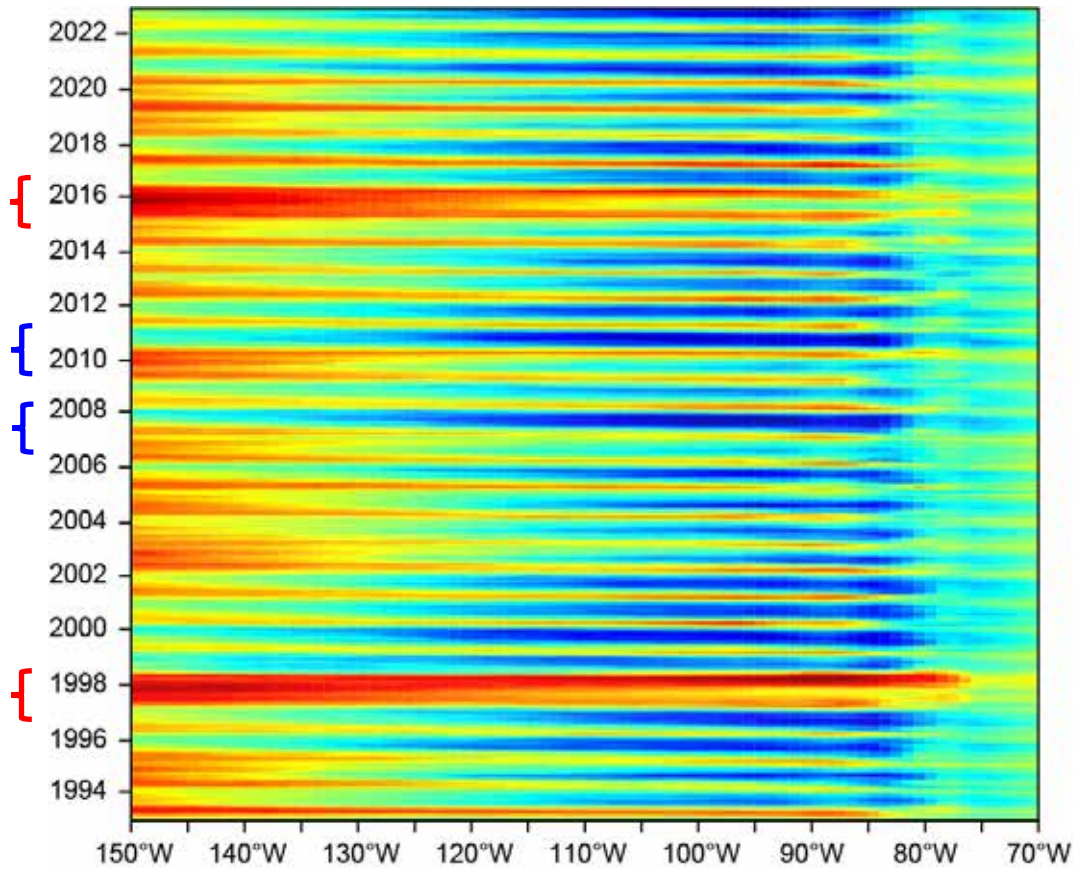
Physical Environment : Oceanic Niño Index (ONI)



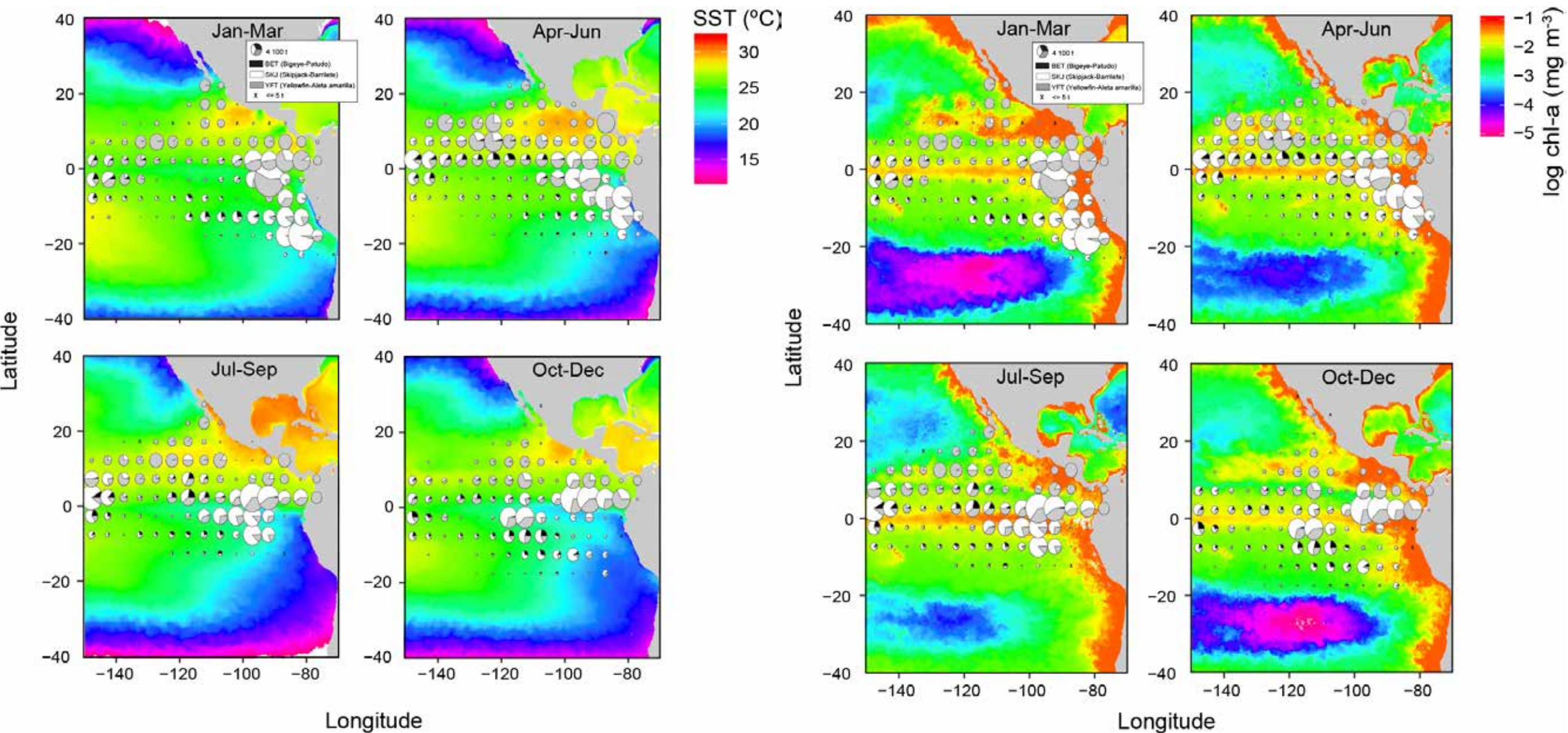
Physical Environment: Pacific Decadal Oscillation Index (PDO)



Physical Environment: SST and chl-a time series

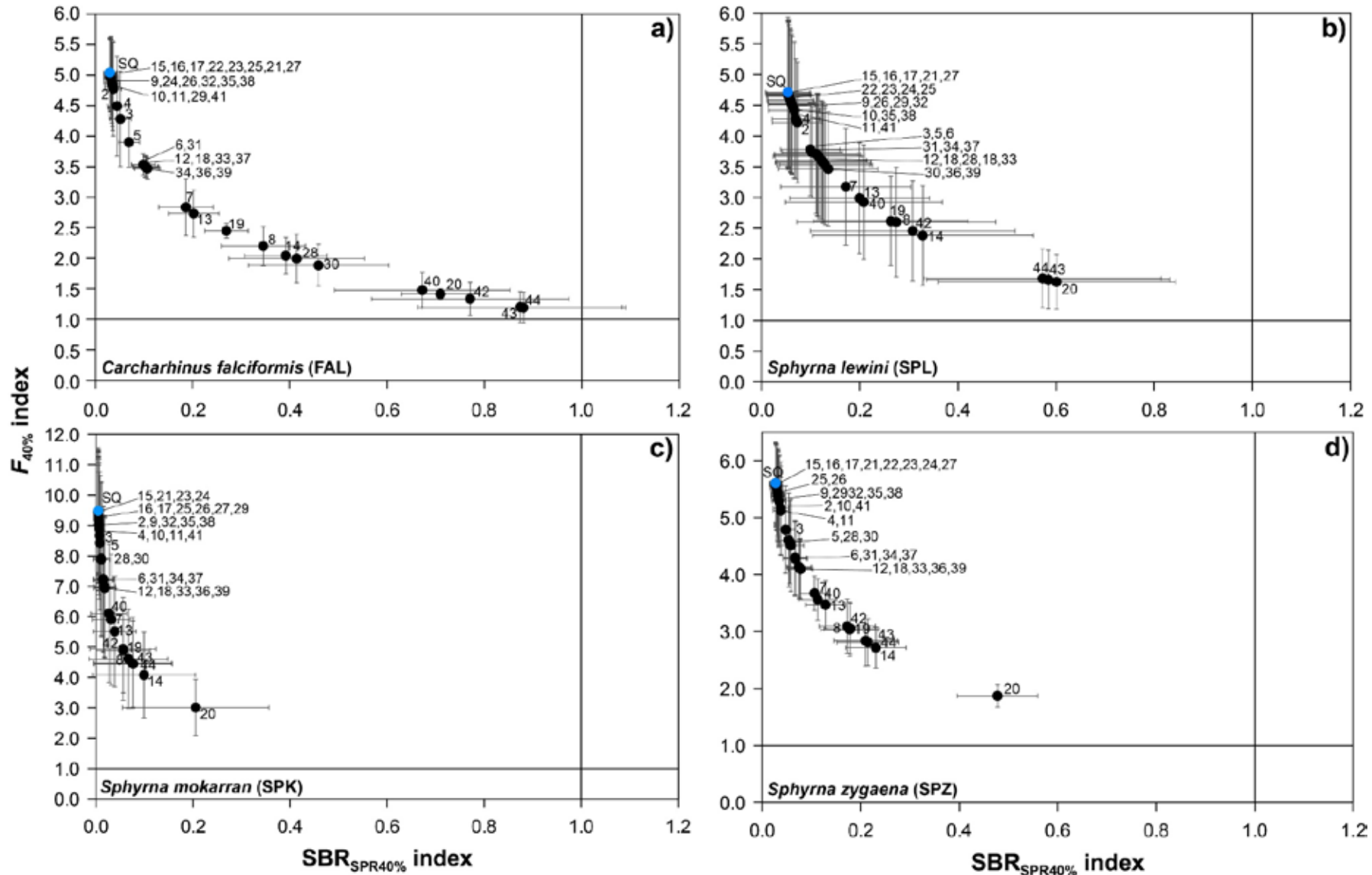


Physical Environment: Quarterly SST and chl-a (2022)

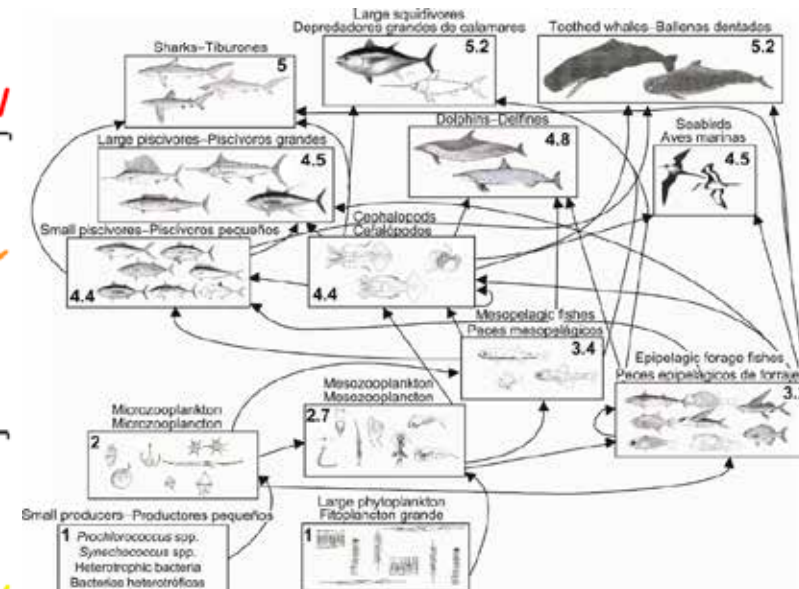
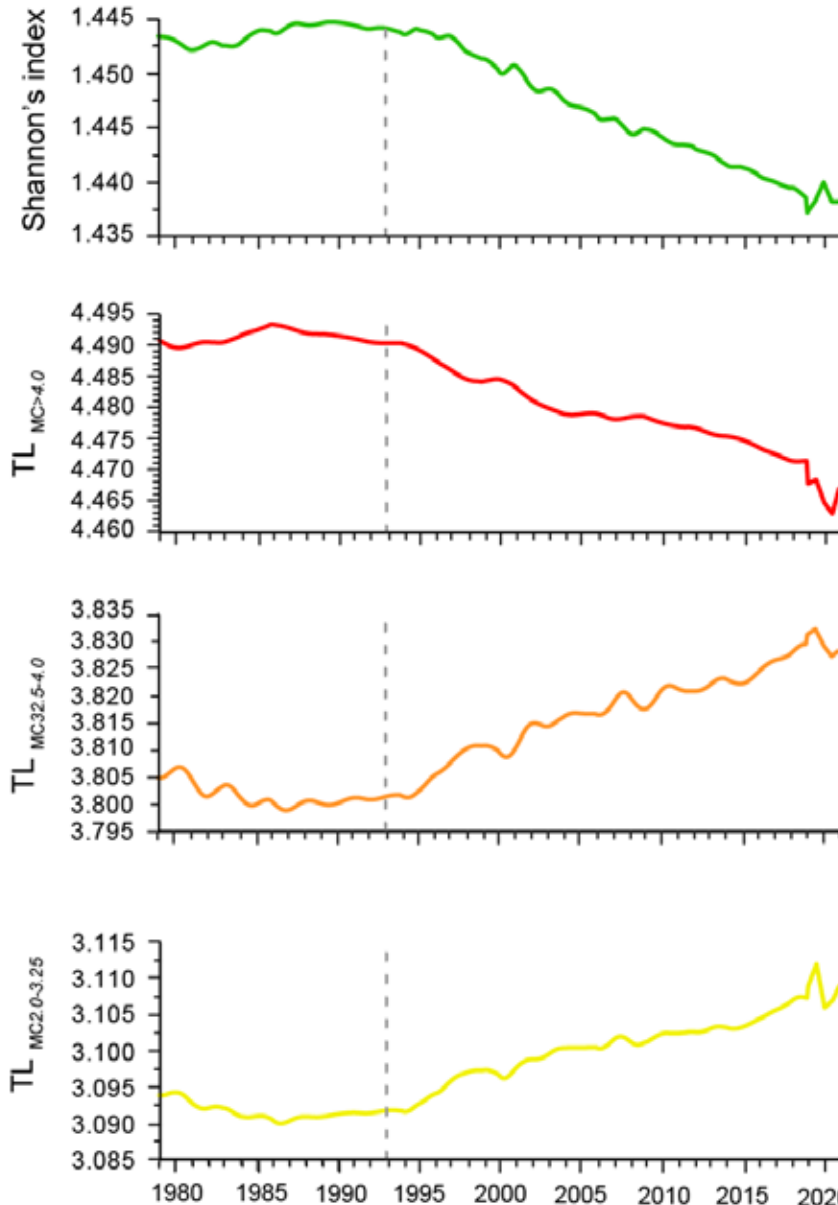
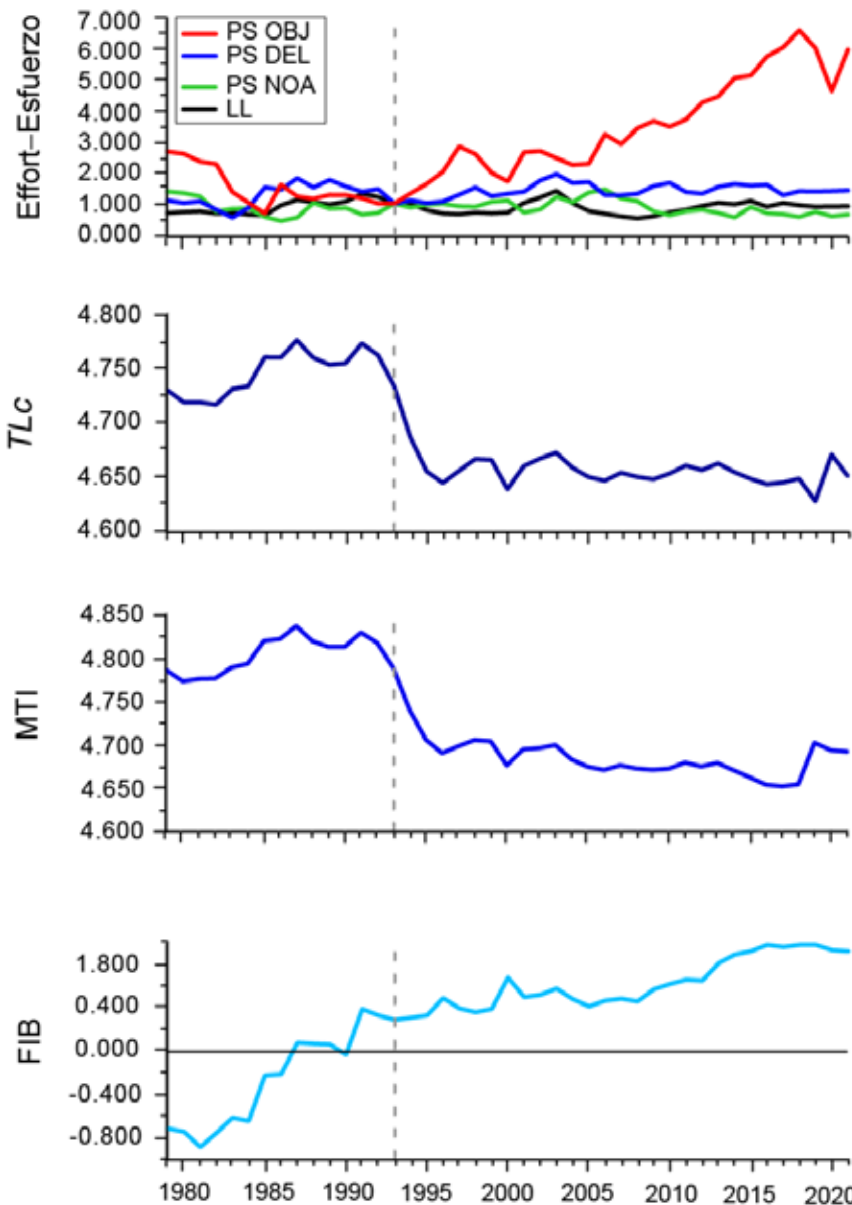


Ecological Risk Assessment: EASI-Fish (see SAC-14-12)

- Exploration of hypothetical conservation and management measures



Ecosystem model updates: ecological indicators



Summary of reporting improvements

- Reporting of non-target species
 - § Time series provides greater transparency of catches; warning system for potentially vulnerable species
- Reporting of environmental indicators
 - § Assists in explanation of changes in catch
 - § New team member (Vulnerable Species Scientist), specializes in climate change, environmental analyses
- Improving ERAs (EASI-Fish), exploration of hypothetical CMM scenarios
 - § spinetail devil ray: [BYC-09-01](#); leatherback turtle: [BYC-11-02](#); 32 shark species: [SAC-13-11](#); silky and hammerhead shark: [SAC-14-12](#)
- But, to further improve bycatch estimates, ERAs and ecosystem models, data collection must continue to be improved
 - § ([IATTC Special Report 25](#); [SAC-12-09](#); [WSDAT-01-01](#); [WSDAT-01-RPT](#); [SAC-14 INF-J](#))
- Together, these provide transparency in how we deliver against our science goals and mandates to consider ecological impacts of EPO fisheries

Future developments: Prioritized research areas

- Continued development of EASI-Fish and its application to 100+ bycatch species
- Establish a longer-term strategy for undertaking studies to fill data gaps ([SAC-14 INF-M: ABNJ Phase 2](#); [Project F.3.a](#); [SAC-14 INF-J](#))
 - § Spatially-explicit catch and effort data, especially for artisanal fisheries for SDMs and assessments
 - § Morphometric (e.g., L-W, L-L, W-W) sampling to improve models and catch estimates
 - § Biological (e.g., stomachs, tissues) sampling to update diet matrix in spatially-explicit ecosystem model
- Continuation of workshops to develop clear data reporting standards and revise [C-03-05](#) ([WSDAT-01-01](#); [WSDAT-01-RPT](#))
 - § Align IATTC's responsibilities in Antigua Convention (i.e., to ensure sustainability of dependent species)
 - § Improve catch estimations and reporting of bycatch in the *Ecosystem Considerations* report



Questions